

REMARKS

Claims 1-24 are pending in this application. By this Amendment, claim 1 is amended. No new matter is added because the amendments to claim 1 are supported by at least the claims, as originally filed. Reconsideration of the application based on the above amendments and the following Remarks is respectfully requested.

The Office Action, on page 4, indicates that claims 8 and 19 recite allowable subject matter. Specifically, the Office Action indicates that these claims would be allowable if rewritten in independent form including all of the features of the base claim and any intervening claims. Applicant appreciates this indication of allowability but respectfully submits that at least independent claim 1, from which these claims directly or indirectly depend, is allowable for at least the reasons set forth below.

The Office Action, on page 2, rejects claims 1-7, 9-18 and 21-24 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,153,427 to Bissett et al. (hereinafter "Bissett"). The Office Action, on page 4, rejects claim 20 under 35 U.S.C. §103(a) as being unpatentable over Bissett as applied to claim 1, and further in view of U.S. Patent No. 5,657,704 to Schueler. These rejections are respectfully traversed.

At the outset, it should be noted that Bissett is discussed in the paragraph beginning on page 3, line 8, in the Background section of Applicant's disclosure. Specific shortfalls in the method of Bissett are discussed with an indication that the method has not been put to a practical application. Shortfalls in the method disclosed in Bissett are among the objectives that the subject matter of the pending claims address.

With specific reference to Fig. 1, Bissett teaches a system for feeding coal into a gasifier operating at high pressures in which a coal-water slurry is heated in a preheater 30 to vaporize a part of the water. The slurry is then mixed with super heated steam from a steam super heater 34 in a nozzle 36 provided at an inlet of the entrained bed dryer 26.

Substantially all of the water present in the coal is flash-evaporated in the dryer 26. Subsequently, the resulting mixture comprising the coal and steam is transferred to a steam-coal separating means, such as the cyclone separator 40, to separate the steam from the dry coal. Only the dry coal is introduced into the gasifier 42 (see Bissett at Col. 3, line 4 - col. 4, line 36 and claims 1 and 5).

Thus, in Bissett, water is flash-evaporated in the entrained bed dryer. The water is not gradually or stepwise vaporized in the pipe in a heater. Further, steam is separated from the coal in the steam-coal separating means, and only dry coal is introduced into the gasifier rather than a whole mixture comprising coal, steam and water being introduced into a combustion furnace or gasification reactor.

Claim 1 recites, among other features, feeding the whole mixture to a combustion furnace or gasification reactor, wherein an inner diameter of the pipe in the heater becomes larger gradually or stepwise along a direction of flow of the mixture, so that the water in the mixture is gradually or stepwise converted into a form of steam. Bissett, as discussed above, neither teaches, nor can it reasonably be considered to have suggested, at least this combination of features.

Further, Bissett fails to describe any configuration in which an inner diameter of a pipe in a heater becomes larger gradually or stepwise along the flow direction of the flow. An advantage of the configuration recited in the pending claims is that a suitable flow rate and predetermined pressure in a pipe can be attained by stepwise or gradually vaporizing water, and erosion and coal sedimentation in the pipe can be reduced and/or prevented. These advantages are discussed in Applicant's disclosure. In this matter, a coal-water slurry can be transferred exclusively through a pipe from pump discharge to the combustion furnace or gasification chamber, and the water can be efficiently vaporized in the pipe. No entrained bed dryer is needed.

For at least the above reasons, Bissett cannot reasonably be considered to teach, or to have suggested, the combination of all of the features positively recited in independent claim 1.

Additionally, the Office Actions fails where it asserts, for example, on page 2, "pressure at discharge of pump will inherently be higher than in furnace or reactor." No objective evidence is provided to support this statement that would meet the standard that such condition necessarily flows from any configuration shown in Bissett. Even if this were the case, the specific ranges of temperatures and pressures recited in the pending claims are not explicitly disclosed in Bissett, nor is any basis provided, by objective evidence, to show that any of the temperature or pressure parameters recited in the pending claims are result-effective variables. Such a showing is a necessary precondition "before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation." See MPEP §2144.05 II. B. citing *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).

Further, the assertion that Applicant has not disclosed that the location or shape of the inner diameter of the pipe has an advantage is without merit. As discussed above, and referenced throughout Applicant's disclosure, there are marked advantages from Applicant's design over any disclosed in the prior art. No objective evidence of record has been shown to support the statement in the Office Action that "one of ordinary skill in the art, furthermore, would have expected Applicant's invention to perform equally well with either the location or shape of Bissett or the claimed location or shape because both locations and shapes perform the same function equally well." This statement relies on an improper construction of the disclosure of Bissett, and the subject matter of at least independent claim 1 in that the subject matter recited in the pending claims represents an improvement over Bissett, as discussed in Applicant's disclosure.

For the Examiner's aid in further assessing the strength of Applicant's arguments, as presented above, Applicant attaches excerpts from Song, Chunshan, "Evaluation of Green Fuel Production Process Concept Developed by IAE of Japan," April 18, 2004; and Katayama et al., "Heat transfer and fluid dynamics in CWS Preheater for Coal Gassifier," 21st Annual Intl. Pittsburgh Coal Conference, September 13-17, 2004. The dates on both of these references post date the December 11, 2003 filing of the PCT Application of which this application is the US National Phase. These references are submitted as evidence that the subject matter of the pending claims is recognized as producing significant advantages over prior art processes, such as those particularly disclosed in Bissett.

For the totality of the above discussion, Bissett cannot reasonably be considered to teach, or to have suggested the combination of all of the features positively recited in independent claim 1. Further, claims 2-7, 9-18, and 20-24 are also neither taught, nor would they have been suggested, by Bissett, even in combination with Schuler, which is not applied in a manner that would overcome of the above-identified shortfalls in the application of Bissett to the subject matter of at least independent claim 1, for at least the respective dependence of these claims directly or indirectly on an allowable independent claim 1, as well as for the separately patentable subject matter that each of these claims recites.

Accordingly, reconsideration and withdrawal of the rejections of claims 1-7, 9-18 and 20-24 under 35 U.S.C. §103(a) as being unpatentable over Bissett, or Bissett and Schuler, are respectfully requested.

In view of the foregoing, Applicant respectfully submits that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-7, 9-18 and 20-24, in addition to the indicated allowable subject matter of claims 8 and 19, are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact Applicant's representative at the telephone number set forth below.

Respectfully submitted,

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WPB:DAT/cfr

Attachments:

- 1) Excerpts from Song, Chunshan, "Evaluation of Green Fuel Production Process Concept Developed by IAE of Japan," April 18, 2004
- 2) Katayama et al., "Heat transfer and fluid dynamics in CWS Preheater for Coal Gassifier," 21st Annual Intl. Pittsburgh Coal Conference, September 13-17, 2004.

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